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AUTHOR Stapp, William B.
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ABSTRACT

This paper contains a discussion of problems related to the development, implementation, and evaluation of environmental education programs (K-12). It is the author's belief that environmental education courses and programs can serve as a vehicle for youth to develop and clarify beliefs, attitudes and values compatible with each individual living harmoniously with his environment. He identifies the constraints affecting the success of environmental education programs and concludes that these are typical of most school systems and are similar to those affectig the success of other instructional programs. A ten phase strategy for establishing a comprehensive environmental education program is outlined. The phases are, in brief, (1) establish a committee to develop, implement, and evaluate the environmental education program and to facilitate communication, (2) establish environmental education goals, (3) establish environmental education objectives, (4) review the literature, (5) establish program goals, (6) establish the curriculum (instructional model), (7) establish a comprehensive inservice teacher education program, (8) develop a reinforcing environment, (9) devise a strategy to overcome program constraints, and (10) develop instruments to evaluate the effectiveness of the program. A 37 item bibliography concludes the material. (PEB)

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# DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF ENVIRONMENTAL EDUCATION PROGRAMS (K-12)

Prepared by

William B. Stapp

Edited by

Albert Bradford

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DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF ENVIRONMENTAL EDUCATION PROGRAMS (K-12)

## Introduction

The foundation for strong citizen action rests to a large degree on what happens in our homes and schools. Today's youth will soon be the voters whose decisions will affect not only the immediate environment in which they live, but also that of our nation. They will make decisions and cast votes about housing, recreation, transportation, beautification, and air and water pollution. It is imperative that schools provide youth with the knowledge and problem-solving skills they need to cope effectively with these life-involving decisions.

Research by Hess and Torney (1967) documents that childhood is a critical time in the development of self-concept and a sense of citizen responsibility. Their research indicates that high school graduates have only a fragmentary knowledge of how a political system functions. It is during these formative years that a youth is acquiring the attitudes, values, and skills which will enable him to make rational decisions.

It is of critical importance, therefore, to obtain better insight into approaches that school systems should consider in assisting youth to become more sensitive to the environment, more informed about the environment, and more inclined and skilled in coping with environmental problems.

An appropriate role for school systems to assume in environmental education is to provide the opportunity for youth to explore their environment, sensorially, physically, and intellectually, in order to obtain both the motivating concern and the factual knowledge necessary to become an environmentally literate citizen. Schools have a responsibility to alert and inform youth about emerging environmental problems and about appropriate ways for them to act in helping to solve and preclude these problems.

More fundamentally, if an important "root cause" of our environmental crisis is people's life-styles, then schools should become a forum for youth to develop and clarify the beliefs, attitudes, and values that are compatible with each individual living harmoniously with his environment.

It is useful at this point to clarify the terms beliefs, attitudes, values, and behavior. Swan (1971) states that beliefs are cognitions, the recognitions of simple pieces of information about almost anything. By themselves, beliefs have little relationship to behavior. Groups of beliefs, both cognitive and affective, may cluster toward a common object and collectively produce attitudes which represent a behavioral predisposition toward that object. Groups of attitudes, in turn, cluster to form values which in turn produce behavior.

Beliefs, attitudes, and values change when those that are held are no longer satisfying to the individual who holds them. If, for example, an individual does not have strong and informed attitudes and values concerning the quality of water flowing through his community, then he will not be distrubed if an industrial complex is lowering the water quality by releasing pollutants into the water system. It is vital, therefore, that schools provide the opportunity for youth to recognize and clarify their values concerning environmental matters.

Furthermore, schools should design instructional programs to help develop skills, such as critical thinking, problem solving, and social change strategies. Such skills assist students to function more effectively in achieving goals arising from their attitudes of concern for the environment.

## Major Constraints To Developing, Implementing, And Evaluating An Environmental Education Program (K-12)

Many constraints confronting environmental education are not unique--they are inherent in the American educational system. It is vital for environmental educators to identify these constraints and team with fellow educators to solve common problems. Four major constraints that need to be recognized and the recommended remedies are discussed below.

First, as the learner proceeds from kindergarten through the twelfth grade, educational material is increasingly organized around disciplines and little emphasis is placed on problem solving. This presents a constraint because environmental education is an interdisciplinary, problem-solving approach. This constraint may be difficult to overcome for some time, as the problem-solving approach may need to become an integral part of collegiate education before it can be successful at the elementary and secondary level.

Second, curricula are already crowded with subject matter material; hence it is difficult to persuade administrators to incorporate additional areas of study into the school day. However, this statement can be countered by indicating that environmental education can link subject matter fields and reinforce the existing curriculum. Environmental education can also provide relevance for existing curricular material.

Third, environmental education cannot avoid value questions. However, many public schools have steered clear of value discussions, particularly those that run counter to community norms and attitudes. Environmental education advocates a value clarification process. This process does not teach a particular set of values. Rather, it stimulates an individual to examine his behavior by clarifying for himself his purposes, beliefs, attitudes, and other value indicators.

Fourth, there is a severe shortage of classroom teachers prepared to effectively integrate environmental education into instructional programs. The traditional approach to the teaching of environmental matters has been for the teacher to become knowledgeable about some aspect of the environment and then convey this information to the student through the lecture approach. This process has not been highly effective in stimulating sustained interest in environmental affairs or helping students acquire beliefs, attitudes, values, or skills conducive to the development of an environmentally literate citizenry.

Several leading environmental educators have advocated an approach whereby the teacher encourages class members to investigate their community environment in an effort to reinforce classroom material and to provide a working knowledge of the human ecosystem. This represents a departure from a "read and discuss" method. Class members view the environment firsthand, attend public hearing, gather relevant information, consider alternative solutions to problems, and advocate solutions through appropriate channels. The teacher's role is not to lecture about the environment but to assist class members in acquiring information relevant to their environmental concerns.

Other constraints affecting the success of environmental education programs are: inflexible scheduling; resistance and apathy on the part of the community, administrators, teachers, or students; youth oppression; lack of community reinforcement of parents, youth groups, peers, and church; funding constraints for transportation, materials, facilities, or personnel; lack of information on the learner's community environment, such as government, housing, solid waste, power generation, water pollution, air pollution, noise pollution, waste water treatment, transportation, and recreation; or the lack of information for the teacher in carrying out an environmental education program such as information on the role of the teacher and student; guidelines for handling values clarification, controversial topics, or social change strategies; and other needed materials.

These constraints are typical of most school systems. All education programs should be periodically evaluated, problems identified, and strategies outlined to overcome the constraints. Many of the problems confronting an environmental education program are similar to those affecting the success of other instructional programs. For this reason, coalitions of administrators, teachers, students, and community citizens should be formed to find ways to overcome mutual problems and to meet the needs of youth.

## Strategy For Curriculum Development, Implementation, And Evaluation In Environmental Education (K-12)

To overcome the constraints outlined in the previous section, strategies for curriculum development, implementation, and evaluation must be developed. The following is a strategy that has been effective in establishing comprehensive environmental education programs in several metropolitan school systems:

Phase 1: Establish a committee to develop, implement, and evaluate the environmental education program and to facilitate communication (page 6)

Phase 2: Establish environmental education goals that the environmental education program will be designed to strive toward (page 6)

Phase 3: Establish environmental education objectives that the program will be designed to achieve (page 7)

Phase 4: Review the literature regarding theories of learning, instruction, and attitudes and behavioral change to serve as guiding principles in the formulation, implementation, and evaluation of the environmental education program (page 7)

Phase 5: Establish program goals to help achieve stated environmental education goals and objectives (page 8)

Phase 6: Establish the curriculum (instructional model) of the environmental education program (page 10)

- Part 1: Philosophy and concepts -- big ideas (page 10)
- Part 2: Processes basic to the program (page 12)
- Part 3: Emphasis of program at different age levels -- K-12 (page 22)
- Part 4: Teaching-learning models(page 23)
- Part 5: Sensitivity guidelines for students entering a community to work on local environmental problems (page 24)

Phase 7: Establish a comprehensive inservice teacher education program (page 25)

Phase 8: Develop a reinforcing environment (page 27)

Phase 9: Strategy to overcome program constraints (page 28)

Phase 10: Develop instruments to evaluate the effectiveness of the environmental education program (page 28)

Phase 1: Establish a committee to develop, implement, and evaluate the environmental education program and to facilitate communication.

The introduction of an environmental education program requires the involvement and preparation of the community, administration, teaching staff, students, and the school supportive staff.

The environmental education committee should include administrators, teachers from various grade levels and subjects, students, local officials, and citizens representing various community interests.

Important duties of an environmental education committee are to:

1. Assist in the development of the philosophy and operating structure of the program;
2. Identify the changes needed to fully implement the program;
3. Identify the power structure of the school system and community;
4. Develop a strategy to implement the program;
5. Implement the program;
6. Administer the program;
7. Maintain effective communication both within the school system and between the school system and community;
8. Evaluate the effectiveness of the program in achieving stated goals and objectives.

In developing an environmental education program for a school system, an environmental education consultant should be retained. The consultant provides the leadership and guidance essential to the success of the program.

Phase 2: Establish environmental education goals that the environmental education program will be designed to strive toward.

Without a clear statement of goals, a program would become a series of unrelated experiences, focusing on limited program objectives.

The general goal of environmental education that a program might strive toward can be stated as follows:

Goal Statement [1]: The goals of environmental education are to develop in individuals:

a. An awareness, understanding and concern for the environment with its associated problems, and

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[1] Master Plan of Environmental Education, State of Michigan.

b. The knowledge, skill, motivation, and commitment to work toward solutions to these current and projected problems.

Subgoal Statements: To achieve the above goals, structures and processes are needed to help individuals and groups to:

a. Obtain an understanding that man is an inseparable part of an environmental system and that whatever he does alters his surroundings,

b. Obtain a basic knowledge of how environmental problems can be solved, and recognize the responsibility of individuals and each segment of society to cooperate in their solution,

c. Develop thinking and action skills for the prevention and correction of environmental abuses.

Phase 3: Establish environmental education objectives that the program will be designed to achieve.

Listed below are three categories around which a school system could develop a series of definitive (measurable) objectives. The Environmental Education Committee of a school system should first define its environmental education goals (Phase 2) and then state measurable objectives in the affective, cognitive, and skill-behavior domains to achieve its goals. Three categories that should be considered while developing objectives toward which the environmental education program should be directed are:

Objective Categories:

a. Affective Subgoal: To help individuals acquire strong feelings fundamental to developing a concern for the environment and a motivation to participate in activities for maintaining and improving the quality of the environment.

b. Cognitive Subgoal: To help individuals acquire basic understanding of the total environment and associated environmental problems.

c. Behavioral-Skill Subgoal: To help individuals develop thinking and action skills for the prevention of environmental degradation, and correction of environmental abuses.

Phase 4: Review the literature regarding theories of learning, instruction, and attitude and behavioral change to serve as guiding principles in the formulation, implementation, and evaluation of the environmental education program.

A recent review of the literature reveals the following points that should be considered in the formulation, implementation, and evaluation of the environmental education program:

1. Behaviors that are positively reinforced are most likely to recur. Desired behaviors should be reinforced by the home, school, church, youth organizations, and so on;
2. The most effective effort is put forth when students try tasks that fall in the "range of challenge" -- not too easy and not too hard -- where success seems likely but not certain;
3. Students are most likely to throw themselves wholeheartedly into any project if they themselves have a meaningful role in the selection and planning of the enterprise;
4. Reaction to excessive direction by the teacher is likely to be apathy conformity, defiance, or escape;
5. What is learned is most likely to be available for use if it is acquired immediately preceding the time when it is needed. Learning, then forgetting, and then relearning when need arises is not an effective procedure;
6. The learning process in school ought to involve dynamic methods of inquiry;
7. Learning takes place through the active behavior of the student. It is what he does that he learns, not what the teacher does. The essential means of an education are the experiences provided, not the things to which the student is merely exposed;
8. One of the keys to motivation is a sense of excitement about discovering for oneself, rather than having a generalization presented by a teacher and requiring a student to prove it;
9. Helping citizens to acquire technical knowledge alone regarding an environmental problem may not increase their concern for the problem;
10. Citizens are most likely to become involved in environmental issues if they personally believe they can have some effect upon decision-making.

Phase 5: Establish program goals to help achieve environmental education goals and objectives.

An important criticism of our public school system is the lack of adequate communication between the various divisions of the school organization. Instead of well-developed series of instructional units and activities commencing at the kindergarten level and terminating in the twelfth grade. Many school systems present instructional material that has little relationship between what has

previously been taught and what will be taught in the future. The K-12 approach is the most sound way to plan a curriculum for environmental education.

Curriculum projects should be planned horizontally as well as vertically. Disciplines, such as science and social studies, should not be studied in isolation; they should be planned so students can utilize the contributions of interdisciplinary studies in understanding and solving environmental problems.

Furthermore, a curriculum program should recognize individual differences. No sequence meets the needs of all students. Therefore, a curriculum should be flexible so material can be presented according to the background, needs, and aspirations of the students.

The following program goals are ways to help achieve the previously stated environmental education goals and objectives:

1. Span the curriculum -- kindergarten through twelfth grade -- so environmental experiences can be presented at every grade level, thereby capitalizing on cumulative effects of the program;
2. Link subject areas that relate most closely to the environment, especially science and social studies, so that both the social and scientific knowledge important in understanding and solving environmental problems are properly developed;
3. Integrate and correlate the program with the existing curriculum in a manner that enhances instructional goals;
4. Strive to increase the learner's interest in, awareness of, and sensitivity toward the environment;
5. Be participant centered -- the learner should play an active role in the learning process and should develop attitudes through personal experiences and thinking and not only through the presentation of predigested conclusions;
6. Focus on the local environment, but do not neglect state, national, and international environmental issues;
7. Focus on contemporary issues in a process-oriented approach;
8. Stress attitudes formation, values clarification, and skill-behavior (critical thinking, problem solving, and social change strategies, etc.);
9. Focus on the future of mankind with a global orientation (spaceship earth philosophy);

10. Provide a comprehensive inservice teacher education program that would: Operate throughout the school year; be directed at assisting teachers to increase their understanding, interest, awareness, and teaching skills in environmental affairs; and involve teachers in curricular development.

Phase 6: Establish the curriculum (instructional model) of the environmental education program.

Successful environmental education programs can be based on different models. The model described below is action oriented and encompasses many aspects advocated by leading environmental educators. The model consists of five integral parts: Philosophy and concepts; processes; emphasis; teaching-learning models; and sensitivity guidelines.

Part I: Philosophy and Concepts (Big Ideas)

An environmental education program should assist the learner in understanding the basic philosophy of spaceship earth. This philosophy is an appropriate framework for a program because its concepts are basic and essential to environmental education. Furthermore, the concepts of spaceship earth can be presented in a manner to be understood by students at various grade levels. The philosophy of spaceship earth should be the "umbrella" for an environmental education program. Some concepts that undergird and support this philosophy are briefly described below:

Closed System: We live in a relatively closed life-support system (notable exceptions are solar energy, cosmic radiation, and meteorites). We have on our spaceship earth all the air, water, and land we will ever have -- space and resources are limited.

Ecosystem: Organisms and their living and nonliving environment are inseparably interrelated and interact upon each other. The exchange of material between the living and nonliving parts follow circular paths. The relationships are complex and extremely vulnerable to sudden or long-term disturbances.

Human Ecosystem: Humans must have a clear understanding that they are an inseparable part of a system, consisting of people, culture, and the biophysical environment, and that they have the ability to alter the interrelationships of this system either constructively or destructively.

Environmental Ethics: The human race must develop an ecological conscience toward the environment that reflects a commitment of individual and group responsibility to future generations. An ethic where humans are not conquerors of the environment but citizens of it. Only when each person and community acts in a responsible, ecologically conscious manner will we be able to live in harmony with, and within, our environment.

Persons who do not possers a human ethic are not likely to practice a land ethic. There is a relationship between these two ethics and both are essential if man is to live compatibly on and compatibly with spaceship earth.

Population: Our earth is threatened and challenged by our rapidly increasing human population. The most common form of overpopulation involves not too many people for available space, but too many people poorly distributed and unable to benefit from existing resources, or too many people for the proper functioning of society. Political instability is likely as long as a few countries continue to consume a disproportionate quantity of the earth's finite supply of resources.

Pollution: Increasing human population, the related and similar increasing levels of consumption of the products of agricultural and industrial production, and the often more rapidly increasing levels of industrial production inevitably result in increasing environmental contamination. Man must add the concept of recycling if we are to maintain our spaceship system, for the residuals of production not only pollute the system but deplete valuable resources.

Environmental Quality: Humans must develop concern for environmental quality, in terms of the physical, social, and psychological effects, which will motivate him to participate in environmental problem solving (such as environmental planning).

Environmental Decisions: If humans are to live harmoniously within our fragile environment, we must rethink consumer and corporate behavioral patterns as well as government policies. New behavioral patterns and policies need to reflect an emerging ethic where mankind is a steward of the environment. The environmental decisions in each of these three arenas should represent collective interests and should be based on evaluation of long-term environmental effects.

Part 2: Processes Basic to the Program

Two basic processes that are an integral part of environmental education are problem solving and valuing. These two processes relate to each other and assist the learner in developing skills in the areas of: Problem definition; data collecting, organizing, and analyzing; generating alternative solutions; evaluating and selecting alternative solutions; and developing, implementing, and evaluating plans of action. These processes also help the learner to develop skills of critical thinking, planned social change, and interpersonal communication.

A basic application of the action-oriented model is community problem solving. Recommended steps are:

1. Identifying and defining the environmental issue or problem;
2. Collecting, organizing, and analyzing data related to the problem;
3. Generating and evaluating alternative solutions;
4. Evaluating the alternatives and selecting the best solutions generated;
5. Developing a plan of action;
6. Implementing the plan of action;
7. Evaluating the implementation process.

A school system desiring to develop an environmental education program based on community problem solving and valuing might wish to have a series of activities (environmental encounters) relating to all grade levels and disciplines available to teachers and students. The number of simple community problem-solving activities (environmental encounters) need not be a large number and could be developed through teacher-student workshops. The activities developed would assist both teachers and students in becoming more familiar with their community and the processes encouraged in this paper. Although classes interested in community problem solving could modify existing environmental encounters developed through a teacher-student workshop, classes should be encouraged to develop their own environmental encounters.

Some environmental encounters need not be strongly problem-oriented. For example, in the lower grades there should be an attempt to bring out basic awareness and appreciation for the environment. An investigation of the school site by a first grade class might expose the children to ecological principles. Although, recognition and solution of relevant problems are appropriate for early grades, the honing of problem-solving skills is more appropriate for the upper grades.

Each encounter should contain a list of desired outcomes. Outcomes should be expressed as behavioral objectives. Behavioral objectives provide direction for the learning process; place greater focus on what the learner does; and provide the opportunity to evaluate the effectiveness of a particular learning experience. Behavioral objectives can be stated in the cognitive, affective, and action domains of educational objectives.

In writing behavioral objectives, it is important that the following criteria be met: (1) Identify the terminal behavior; (2) describe the situation in which the behavior is to be observed; and (3) establish the extent to which the student should exhibit the behavior (Montague and Butts, 1968).

A sample of an environmental encounter prepared for an early elementary level class in a teacher-student workshop in a metropolitan environment, is as follows:

## Investigating Air Pollution

BEHAVIORAL OBJECTIVES:

At the completion of a successful encounter, the student should be able to:

1. Describe what is meant by air pollution.
2. Describe ways that air is polluted.
3. Describe ways that rain water is affected by air pollution.
4. Name ways to identify pollution in air.
5. List air pollution problems in his neighborhood.
6. Name possible solutions to a neighborhood air pollution problem.

ACTIVITIES:

1. Discuss in class what is meant by air pollution. Is it man-made or natural or both? What does it do to living things? To nonliving things? Can it harm you? Where is it most common? What are some of the pollutants?
2. Take a walking tour of your neighborhood. Look for open burning, smoke coming from chimneys, fumes coming from cars, and other evidences of air pollution.
3. A few days after a snowfall look closely at the snow. Are there dark particles on the snow? If there are dark particles on the snow, where did they come from?

4. Place a clean paper on a windowsill. Check the paper daily to see if there are any particles on the paper. If there are particles on the paper, where did they come from?
5. Have your school custodian show children how he uses a filter in the furnance to keep dust particles from going into the air.
6. Strain collected rainwater from your school building and pour it through some gauze. Did the gauze remove any particles from the rainwater?
7. See a filmstrip or pictures showing some types of air pollution and ways of stopping air pollution.
8. Take the class to the school parking lot. Place a cloth over the tailpipe of an auto and start the engine. After a short period of time, remove the cloth and allow the students to examine it. What do you see on the cloth? What type of pollutant is this?
9. Hold a paper in front of the tailpipe. What is coming out of the engine which causes the paper to flutter? Can you smell the gases? Do all gases have an odor?
10. Since you know some of the causes of air pollution now, how can your family help with this problem?
11. How can you help the air pollution problem?

A sample of an environmental encounter prepared for a middle school level class in a teacher-student workshop in a metropolitan environment, is as follows:

## Investigating Solid Waste Disposal in the Community

BEHAVIORAL OBJECTIVES:

At the completion of a successful encounter, the student should be able to:

1. Explain and give a specific example of each of the following terms:
   a. Solid waste
   b. Sanitary landfill
   c. Incinerator
   d. Compactor
   e. Recycling
   f. Composting
2. Illustrate methods used in disposing of solid waste.
3. Explain how solid waste is disposed of at his school and in his community.
4. Identify solid waste disposal problems that face his school and local community.
5. List reasons why solid waste disposal is becoming an increasing problem within his community.

6. Describe in writing the ordinances governing the disposal and recycling of solid waste in his community.

7. List alternative solutions to the solid waste disposal problem at his school and/or in his community.

8. Help plan, organize, and carry out one of the suggested alternative solutions to the solid waste disposal problem at his school and/or in his community.

ACTIVITIES:

1. As an introduction to solid waste, view and discuss in the classroom a film on solid waste disposal - For example:

   a. Little Monster - Keep America Beautiful, Inc.

   b. The Third Pollution - Stuart Finley, Inc.
      3428 Mansfield Rd.
      Falls Church, Va. 22041

2. After viewing and discussing the film, make a list of the questions you would like answered, that would help you understand the solid waste disposal program in your school and community. For example:

   a. How do the following individuals or organizations dispose of their solid waste materials:

      1. Home Owners
      2. Schools
      3. Businessess
      4. Industry

   b. What type of disposal sites or facilities are available in your community?

   c. How is the solid waste material transported from its source of origin to the disposal site?

   d. What are some of the problems that your school and community faces concerning the disposal of solid waste?

   e. What are the reasons for these problems?

   f. What are the future community plans for the improvement of solid waste disposal?

3. Identify and list the individuals and/or organizations that might be able to help you become informed concerning the solid waste disposal program in the community. For example:

   a. County Planning Commission

   b. County Health Department

   c. Local Governmental Officials

   d. Local Planning Commission

4. Write letters to these individuals or organizations requesting:
    a. General information concerning solid waste disposal
    b. Answers to your specific questions
5. Invite one or more of the people on your resource list to discuss your community solid waste disposal program with the class.
6. Take a field trip to become familiar with the type (types) and operation of the disposal sites available in your community.
    a. How costly is the operation of the facility?
    b. What are the advantages of the particular type of facility used?
    c. What are the disadvantages of the particular type facility used?
    d. What are the future plans for the improvement of the facility used?
7. Make a model of the method (methods) used in disposing of solid waste in your school and/or community.
8. Invite the school principal and/or custodian to discuss with your class how solid waste is disposed of at school.
    a. Is an incinerator used? If so, how does it operate? What are the advantages and disadvantages of using an incinerator? How costly is it to operate the incinerator?
    b. Is a compactor used? If so, how does it operate? What are the advantages and disadvantages of using a compactor? How costly is it to operate a compactor?
    c. Is the solid waste collected by truck? If so, where is it taken? What are the advantages and disadvantages of this method? How costly is this method?
9. Interview the appropriate local governmental officials to find out about the ordinances governing the disposal and recycling of solid waste material in your community.
10. Help plan, organize, and carry out a recycling program that would help your school and/or community reduce the amount of solid waste material that must be disposed of. For example:

a. Glass Recycling Program

b. Aluminum Can Recycling Program

c. Paper Recycling Program

d. Compost Pile

e. Other ideas

An example of an environmental encounter prepared for a high school American Government class in a teacher-student workshop in a metropolitan environment, is as follows:

Flood Plain Zoning

BEHAVIORAL OBJECTIVES:

At the completion of a successful encounter, the student should be able to:

1. Draw on a map of his community the flood plains (fifty year flood line) of the (name) River from (location) to (location) and record accurately how each flood plain is developed;
2. Describe in writing the number of floods and flood damage that has occurred on the flood plains of the (name) River from (location) to (location) over the past sixty years (or over the time that records have been filed);
3. Describe in writing the major provisions in the laws of his State and community regarding flood plain zoning;
4. Identify the power structure (pressure groups, governmental committees, governmental policy makers) of his community regarding who influences and makes policy on flood plain development and zoning.

ACTIVITIES:

1. Take a tour (or illustrate by slides) along the (name) River from (location) to (location) and note the following:
   a. Are there a series of flood plains?
   b. How are the flood plains developed?
   c. Approximately how much damage (dollars, lives, inconveniences) has occurred on the flood plains as a result of flooding over the past sixty years?
   d. What does your State flood plain ordinance say? If none exists, is it considering such an ordinance?
   e. What does your community flood plain ordinance say? If none exists, is it considering such an ordinance?

f. How is the undeveloped land on the flood plain zoned?

g. Are there any current proposals to utilize the undeveloped flood plains of your river for recreational, residential, commercial, or industrial development?

h. What proposals seem wise or unwise in light of the hazards you have identified?

3. Draw on a map of your community the flood plains (fifty-year flood line) of the (name) River from (location) to (location) and record how each flood plain is developed.

4. Determine by interviews the points of view of land developers, community citizens, realtors, chamber of commerce officials, planning commission members, city council members, and students of your class regarding the future development of the flood plains of the (name) River from (location) to (location).

5. Based on the information collected, have the class formulate alternative solutions to the development (or preservation) of the flood plains on the (name) River from (location) to (location).

6. Draw a chart of the power structure (pressure groups, governmental committees, governmental policy makers) of your community regarding who influences (underline the influencers) and makes policy (circle the policy makers) on flood plain development zoning.

7. If the solution advocated by the class members is different from the point of view held by the planning commission and policy makers of your community, then develop and implement a plan of action (presentation to the appropriate authority, develop a fact sheet, publicize your position, etc.).

Each environmental encounter should also provide data regarding sources of additional information relevant to the topic.

Encounters could be placed on "punch cards" and filed in a box, accompanied by a long metal needle. The box could be placed in the library or office of every school in the system and available as models for student and teacher usage. Following is an example of a format of an environmental encounter punch card, (Figure 5).

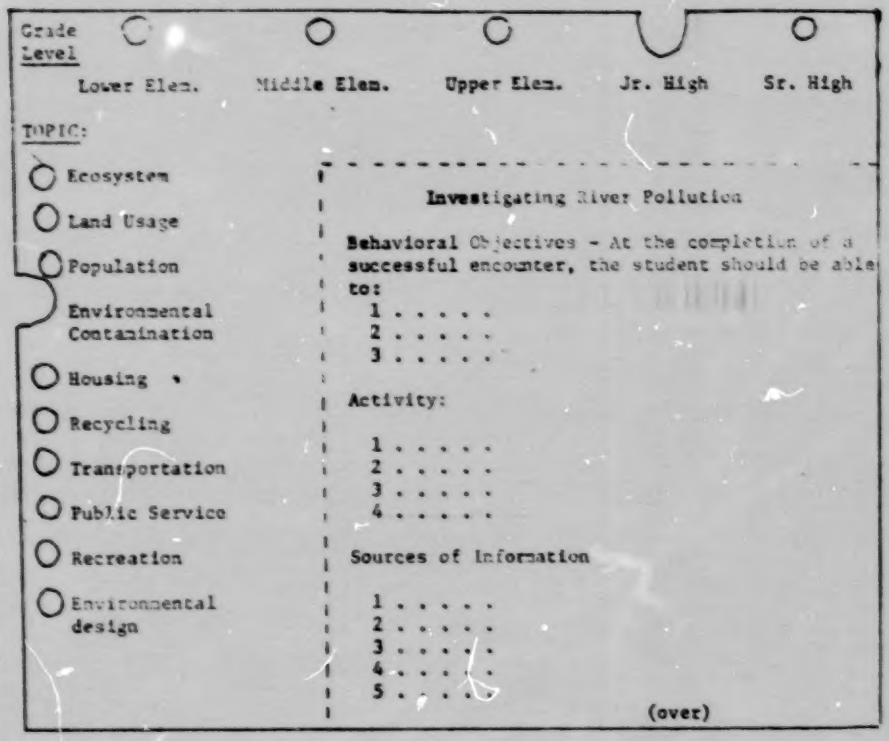



**Figure 5. A Sample Environmental Encounter Punch Card**

To utilize the punch card system, a teacher, student, or group of students could review "environmental contamination encounters" prepared for junior high students in a teacher-student workshop by following the procedural steps described below:

1. Place needle through the appropriate grade level (junior high) and raise needle to free cards. Collect the freed cards (junior high) and continue to point #2.
2. Place needle through the appropriate topic (environmental contamination) and raise needle to free cards. The freed cards represent all of the "environmental contamination" encounters developed for junior high students.

Environmental encounters removed from the file could either be implemented (by a student, group of students, or class), modified to meet specific interests, or serve as a model for developing one's own encounter.

By using the problem-solving process, students acquire both knowledge and skills important in dealing with environmental problems relevant to them. The knowledge and skills acquired can be used in working toward future environmental problems.

Community problem solving also provides an excellent opportunity to focus on values clarification. The values clarification process advocated by Raths, Harman, and Simon includes the three action aspects of choosing, prizing, and acting. The steps advocated in the values clarification process are:

1. Students are presented with an issue.
2. Students suggest alternative solutions.
3. Students consider the consequences of each alternative.
4. Students express their feelings about each alternative.
5. Students make a free choice.

The values clarification approach helps students become aware of personal beliefs, attitudes, values, and behaviors which they prize and are committed to both in and out of the classroom. This process assists students in considering alternative solutions and the implications of each alternative. An important role of the teacher is to help each student to consider whether one's stated beliefs, attitudes, and values are congruent with one's actions.

A student begins to develop his own set of values when he starts to consider alternatives, the consequences of alternatives, and his personal feelings toward each alternative before he acts.

Simon, Howe, and Kirschenbaum in their book, Values Clarification, have outlined over 80 strategies to assist individuals in clarifying their values. Some of the more useful strategies are: name card, physical continuum, voting questions, rank order, baker's dozen, brand names, 20 questions, panel discussion, and eco-action cards. Each of the above strategies provides a piece of information. Any one strategy surfaces little information, but the combination of strategies provides meaningful information regarding an individual's values.

When using values clarification strategies, it is important to provide a classroom atmosphere of openness, honesty, acceptance, and respect. If students feel that information they are asked to share about their beliefs, attitudes, values, and behavior will be ridiculed by their peers or attacked by their teachers, they will not share their true thoughts and feelings about value issues in an open and honest manner.

It is vitally important that teachers clarify their own values and participate in valuing exercises and discussions. However, under many circumstances it may be wise for a teacher to hold off on a discussion regarding his own values in a classroom setting until the members of the class have had a chance to surface their own values -- thereby not hindering a free and open discussion. It is also important that a teacher present himself as a person who has given a great deal of thought to his own values and acts accordingly.

Why is value clarification being advocated over inculcation, instilling, and fostering? Because inculcating, instilling and fostering add up to indoctrination, and social research has pointed out that indoctrination is not very effective in helping an individual to behave in a consistent pattern. The indoctrination processes of the past have generally failed to help individuals grapple with the conflicts which accompany most issues.

It is also worth noting that the values-clarification procedure focuses on the "process of valuing" and not on the transmission of any "right set of values" (Simon, 1971).

Values clarification is of paramount importance in making rational environmental decisions every day of a person's life, and must be a basic part of every environmental education program. Values clarification stimulates an individual to examine his behavior by clarifying for himself his purpose, beliefs, attitudes, and other value indicators. It helps to alleviate and remove the inconsistencies that might exist in an individual's life and encourages the development of self-concept.

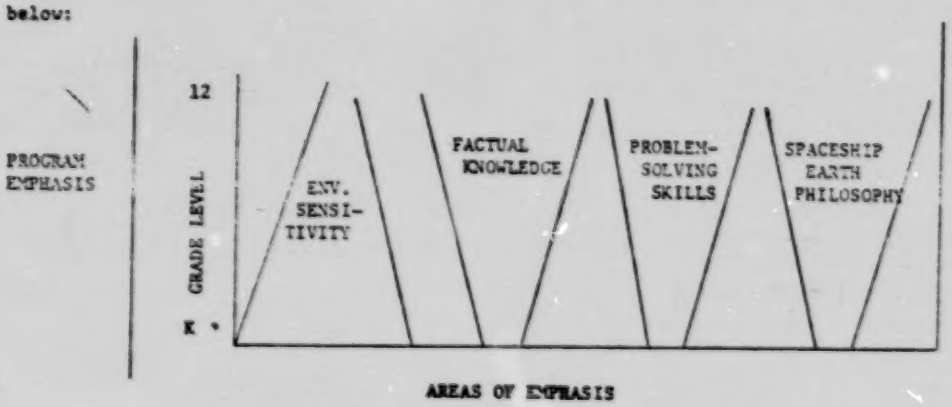
Gaming and simulations provide a teaching technique for students to gain wider perspective and an understanding of ecological, economic, and political systems important in the problem-solving and valuing processes. There are a variety of games on the market that enable students to assume roles of different individuals (planning director, industrialist, lawyer, wage earner) in order for the learner to obtain an accurate perspective of an environmental issue or to understand government or the planning process. Some complex and sophisticated games feed into computer programs which simulate the "environment." Personal participation in gaming-simulations allows participants to acquire an understanding of how real-world systems function. Gaming-simulations can be used in the environmental encounter process to enable the learner to understand a particular system (ecological, economic, political) prior to the action phase. This might stimulate class interest and provide students with better insight into possible action strategies.

Part 3: Emphasis of Program at Different Age Levels (K-12)

Environmental education activities at each grade level should focus on the affective (feeling), cognitive (knowing), and skill-behavior domains. Emphasis in the early years, however, should be in the affective domain and in the later years on the cognitive and skill-behavior domain. The learner should also be provided with opportunities to explore his immediate environment with all of his senses -- sight, hearing, smell, touch, and taste. The learner should be exposed to a variety of physical and social environments in order to have experiences to judge the quality of his immediate environment. For example, an inner-city child who has never experienced clean air, uncrowded housing, safe streets, unpolluted water, healthy trees, and rich soil, may not have a quality "measuring stick" by which to judge his home environment. Likewise, a rural child may accept a pristine environment, not knowing that it can be degraded if people are not active in maintaining a quality environment.

If a child learns to appreciate and respect environmental resources, he may want to learn more and be willing to protect what he appreciates. Many programs emphasize knowledge rather than feelings in the early years. This emphasis is less likely to produce an individual who strives for more knowledge or has a motivating concern that will result in a tendency to act if the environment becomes degraded.

The recommended emphases for an environmental education program are outlined below:



Part 4: Teaching-Learning Models

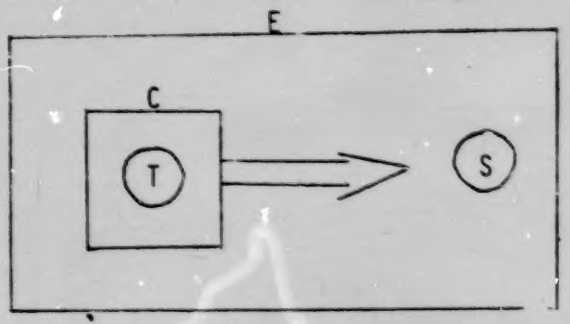
There is no single teaching model that all students will respond favorably toward under all circumstances. Some students learn best when the teacher is acting as a conveyor of information. Other students learn best when there is an atmosphere of strong teacher-student interaction. It is important for a teacher to assess his/her personal skills and the situation and then blend teaching models in an effort to achieve the best learning environment.

The teaching model traditionally employed in most American classrooms is characterized by a teacher who digests a predetermined body of information and then conveys this material to the student. Such a role is illustrated by Figure 1. When the teacher functions in this role, the content and the subject matter have already been determined by publishers, committees, administrators, or a school board. The teacher becomes familiar with the content and then assumes the role of expert in conveying this information to the student. The student is presumed to have few attitudes or thoughts about the content until after the unit has been completed. The virtue of this model -- or teaching based on it -- is that it is neat, tight, controlled, and orderly. Its weakness is that it is not very effective in achieving the outcomes sought by the action-oriented model being discussed in this section.

The amount of information available on the environment and the recent demand of students for relevancy in educational programs calls for a teaching model where the instructor does not serve as the principle source of information. The role of the teacher is to create a learning environment, assist students in acquiring information, provide guidance to the student, and to participate with the student in the learning process.

Research studies have shown that teachers are highly effective when they participate in learning projects as "team members," guides, and counselors, rather than as star performers. This means that many of the functions traditionally regarded as the prerogative of the teacher should be conducted by the students. Decisions on which activities will be pursued, and by whom, should be determined by the students, with advice and guidance from the teacher. This concept of the role of the teacher is illustrated by Figure 2.

The various aspects of the model discussed in this section are illustrated by Figure 3.



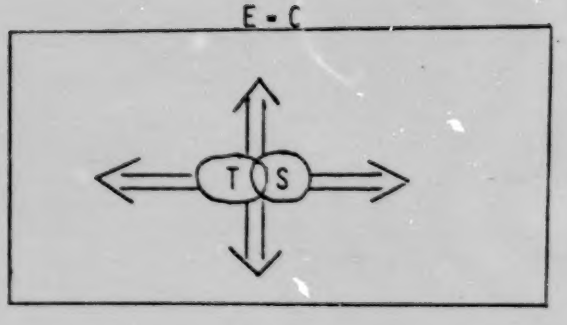

E = Environment

C = Content

T = Teacher

S = Student

Figure 1: TEACHER AS CONVEYER OF INFORMATION




E = Environment

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Figure 2: TEACHER-STUDENT INTERACTION

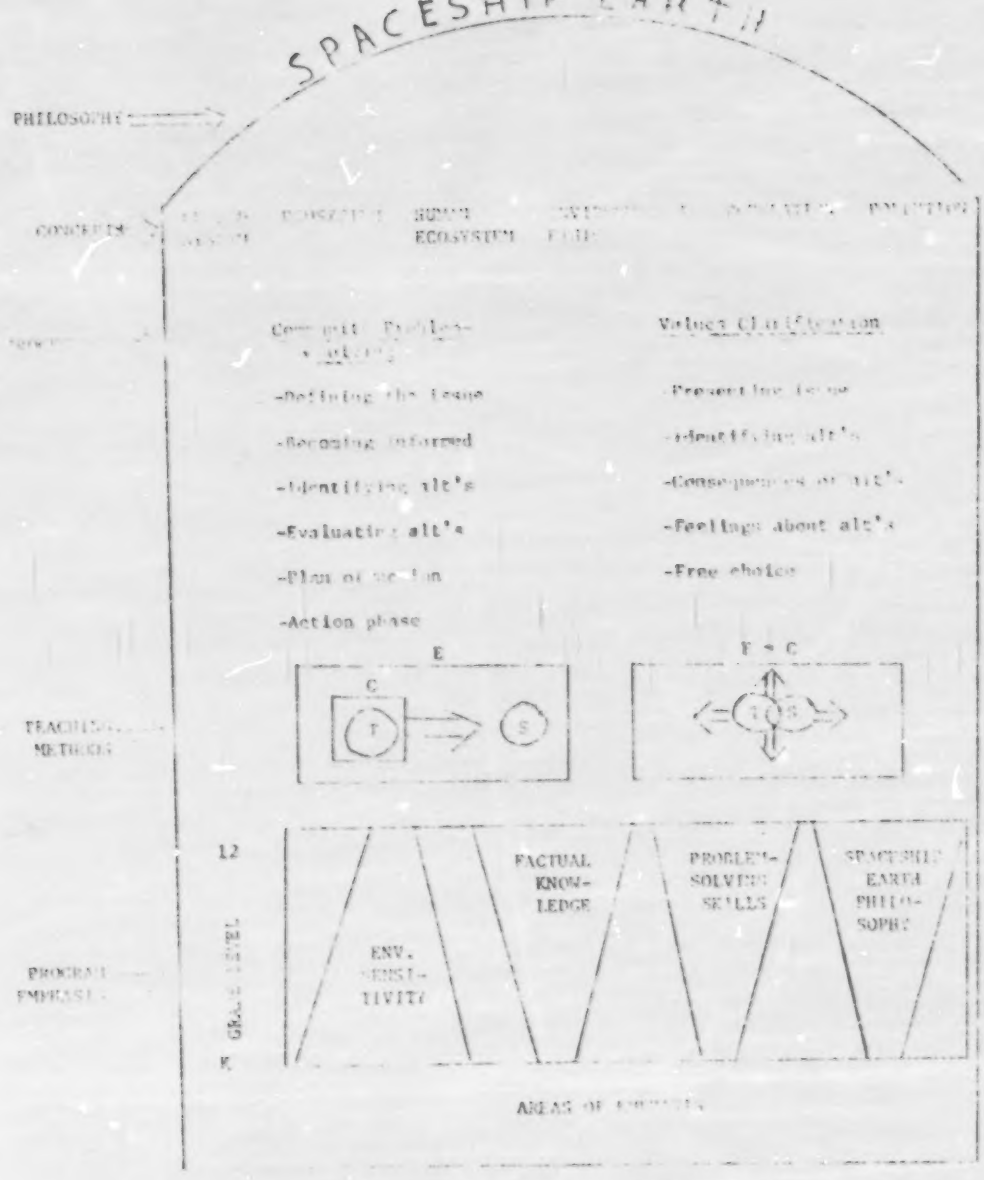


Figure 1: ENVIRONMENTAL EDUCATION MODEL

Part 5: Sensitivity Guidelines for Students Entering a Community to Work on Local Environmental Problems

Students entering a community to work toward the solution of local environmental problems should receive intrapersonal and interpersonal training. It is also important that consideration be given to the process of identifying, selecting, implementing, and evaluating community action projects. The following guidelines have been developed for these purposes to aid students involved in community action projects.

1. Self and resource evaluation
   a. Be aware of your personal values (e.g., elitism-classism, racism, sexism, ageism, etc.) and arrange for training sessions to work on value conflicts.
   b. Be aware of personal values that might be different from the values of the community sector that you will be working with. Arrange for training sessions to work on value conflicts and to foster value sensitivity.
   c. Be aware of interpersonal relationships and arrange for training sessions to work on problem areas (personality barriers, working relationships, etc.).
   d. Be aware of the resources that you and each of the other members bring to the team.
2. Sensitivity toward the community
   a. Do not enter the community like gangbusters.
   b. Be a good community listener.
   c. Do not seek to replace existing community leaders. They will be there long after you leave.
   d. Be informed about the community (the people, the government, politics, functioning of community, living conditions, environmental status, concerns of the residents, etc.).
   e. Be aware of and work with community people and organizations that have the resources and past experience to assist you in your community problem-solving project.
3. Identification of community projects
   a. Obtain ideas from students, faculty, school administration, citizens, government officials.
   b. Attend public hearings and meetings.

c. Read community newspapers and newsletters.

d. Listen to local public-affairs radio and tv programs.

4. Selection of community action projects

a. Review all community projects identified through process 3 (above).

b. Make your project selection after considering items such as student interest in project, student and community priorities, available resources, funding, risks involved (personal, class, school, etc.), school board policy, and the social implications of the work you are planning in that community.

5. Implementation of community action projects

a. Involve the learner; do not be leader-centered.

b. Be a facilitator, not a commentator.

c. Give credit where credit is due; practice humbleness.

d. Be aware of the social implications of your actions.

e. Develop strong ties with community individuals and organizations in order to build your power base and to provide on-going support for the project.

Phase 7: Establish a Comprehensive In-service Teacher Education Program

To assist youth in acquiring a working knowledge of the spaceship earth philosophy, and the attitudes and skills essential in helping to resolve environmental problems, teacher education programs must be an integral part of an environmental education program.

The thrust of such a program should be toward a system aimed at helping teachers to acquire the concern, knowledge, and skills that will enable them to do the following:

1. Successfully explore relevant environmental issues with students;
2. Encourage students to express their feelings, perceptions, and ideas;
3. Foster an atmosphere where information and ideas can be freely expressed and exchanged and the views of individuals and organizations heard and respected;
4. Encourage teachers and class members to analyze and clarify personal values;
5. Serve as a resource person in assisting students in acquiring information;
6. Assist in the implementation of appropriate solutions devised by students.

In handling inservice teacher education workshops, teachers should be involved not only in discussing various matters concerning environmental education, but

involved in researching and developing guidelines and instructional materials related to the program.

In developing an inservice teacher education program, the following should be considered:

1. Orientation sessions for all teachers and administrators as to the philosophy and structure of the environmental education program;
2. Involvement of teachers at all grade levels and subject areas;
3. Discussion and development of written guidelines on:
   a. Ways to integrate environmental education into the existing curriculum;
   b. The role of the teacher and student in selecting, planning, executing, and evaluating environmental education activities;
   c. The school system's administrative policies and procedures that relate to environmental education;
   d. Handling value analysis and clarification;
   e. Handling controversial issues.
4. Development of written materials and instructional aids to assist teachers in understanding and presenting environmental information;
5. Designing and offering training sessions on ways to handle topics, such as values, community problem-solving, and community sensitivity.
6. Developing a means of distributing to teachers, staff, administrators, and students information relevant to environmental education;
7. Arrangement for educational experiences to occur on school sites and in the neighborhood and community;
8. Development of a series of booklets containing information (environmental inventory) on the local community in areas such as government; housing; transportation; solid waste; water resources; air resources; waste water treatment; recreation; urban trees; yard care; public open space; etc. The following information should be included for <u>each</u> topic: Basic information; problems and alternative solutions; field trips and tour opportunities; local resource people; instructional aids (films, filmstrips, slides, environmental games and simulations, environmental kits, overlays, etc.), and other helpful information. The material should be produced in local workshops by teachers and students working as teams, and made available to students, teachers, and administrators throughout the school system;

9. Providing the opportunity for teachers and students to communicate to parents and the community regarding the philosophy and operation of the environmental education program; and
10. Promotion of local collegiate offerings and adult education programs for teachers interested in furthering their training in environmental education.

The first phase of the inservice teacher training program should be to include all teachers and administrators in the development of the philosophy, structure, and operation of the environmental education program.

The second phase should be to plan tours of the community to provide teachers and administrators with first-hand experiences regarding their local environment and associated problems. Discussion should center on the local environment with an examination of relevant issues from an ecological, economic, political, social, and technological point of view. Emphasis should also be on ways to integrate community environmental studies into the school program. Information should be developed regarding the names of community citizens and governmental officials knowledgeable on the environment and available to serve the school system as resource persons.

The third phase should be to offer a series of teacher-student workshops to discuss and produce written guidelines and materials designed to assist teachers in implementing the goals and objectives of the environmental education program.

The fourth phase should be to offer a series of teacher-student workshops on special topics, such as: Community problem solving, values clarification, community sensitivity, and school site development and usage.

Phase 8: Develop a Reinforcing Environment

It is imperative to keep in mind that to change an individual's beliefs, attitudes, values, and behavioral patterns, a very strong and reinforcing environment is normally required. For this reason, it is vital that the environmental education committee work with all components of the community to identify ways that each component can assist the school system in achieving its stated environmental education objectives. It is also important that each component group make an assessment of its own program in an effort to strengthen its environmental education contribution to the entire community (such as sponsoring seminars, producing materials, providing tours, giving presentations, offering technical

assistance, providing services, etc.) In this manner, as youth and adults circulate daily in their community, they will be touched by environmental concerns from many sources. This type of community reinforcement is vital in both forming and changing attitudes, values, and behaviors.

Some important component groups in most communities that have must to offer to the environmental education movement are: agencies, agriculture, businesses, churches, citizen organizations, elementary and secondary education, government, higher education, industry, labor, pre-school, and youth organizations.

Phase 9: Strategy to Overcome Program Constraints

To help overcome constraints to the full implementation of an environmental education program, it is important that the environmental education committee identify problems (constraints) that need to be overcome for the environmental education program to be fully successful. Once this is done, the environmental education committee could use a "force field analysis" to help resolve each problem. This is a process by which you clearly state each problem and a goal to help overcome the problem. The next step in a "force field analysis" is to make an assessment of one's strengths (driving forces) and weaknesses (restraining forces) pertaining to the particular problem. Finally, identify possible actions and strategies to help achieve one's goals by using the driving forces to help overcome the restraining forces. Careful thought should be directed toward appropriate channels for implementing the proposed action (board of education, superintendent, curriculum committee, principal, school-community committee, P.T.A., student council, etc.). Refer to Figure 4 for a sample "Force Field Analysis Sheet."

Phase 10: Develop Instruments to Evaluate the Effectiveness of the Environmental Education Program

It is imperative that environmental education programs be evaluated periodically to determine if the stated objectives of the program are being achieved. The results of the evaluation should be fed back so that the program can be modified to reflect information derived from the evaluative instruments.

Reliable evaluative instruments have been developed in the field of environmental education to measure student and teacher changes in areas such as: community orientation; cognitive domain; affective domain; skill-behavior domain; environmental perception; values; exploratory behavior; self-concept; teacher-student interaction; motivation; and concept understanding. Individuals or

committees interested in evaluating environmental education programs should become familiar with evaluative instruments reported by the following: Bennett, 1972; Edward, 1950; Flanders, 1962; Larson, 1972; Oppenheim, 1966; Rentsch, 1973; Robinson, 1970; Roth, 1970; Stapp, et al., 1972; Swan, 1969; and Webb, 1970.

A very well-designed instrument for evaluating a comprehensive environmental education program was developed by Dr. Dean Bennett (1972) for the Environmental Education Program, Yarmouth, Maine. This instrument could be modified to meet the needs of many environmental education programs.

It is important that the evaluative instruments be as objective, reliable, and valid as humanly possible. It is vital that environmental education programs be evaluated and reported in the literature.

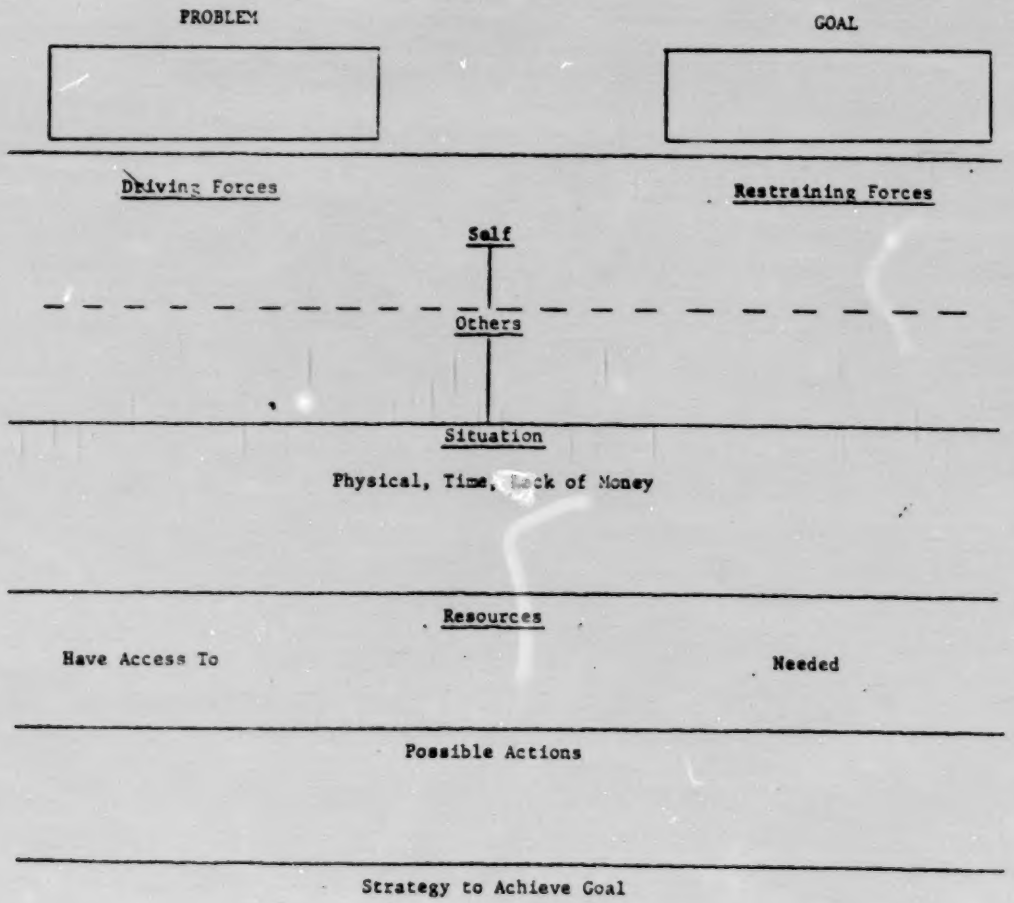


Figure 4: FORCE FIELD ANALYSIS SHEET

## The Toledo Environmental Education Program --- Based on the Action Model Presented in This Paper

In the spring of 1970 the Toledo, Ohio, Board of Education expressed interest in developing a broad-based environmental education program. This provided an opportunity to integrate the environmental education model described in this chapter on a system-wide basis within a sizable metropolitan school district of sixty-six elementary and junior high schools, and eleven senior high schools. The school system's environment is beset by all of the problems characteristic of urban America. The major objectives of the first year of the program were to establish the philosophy and operating structure of the program and to identify schools in which to initiate the program. The first step was to develop a broad-based committee of administrators, teachers, students, university educators, representatives of business and industry, and interested citizens. In October, 1970, this thirty-member Toledo Environmental Education Committee began developing a seven-phase strategy for establishing an environmental education curriculum. This included describing the overall philosophy and goals of the program, reviewing the literature on learning theory, organizing the curriculum, establishing the curriculum, developing instruments for evaluating the effectiveness of the curriculum, establishing an inservice teacher education program, and developing operating objectives for the first year of the program.

In September 1971 the environmental education program was ready for implementation. The operating objectives for the second year of the program were as follows:

- --Select three schools (an elementary, junior high, and senior high) as model schools for the program.
- --Select pilot classrooms within each of the model schools.
- --Arrange for each pilot class to develop, conduct, and evaluate at least one environmental encounter.
- --Conduct and evaluate a teachers' and administrators' workshop on an "Environmental Inventory of Toledo."

--Conduct and evaluate a teachers' and administrators' workshop on the subject of guidelines for the teacher in attaining the goals of the program.

--Conduct and evaluate a teacher's inservice workshop on the subject of writing environmental encounters.

--Train at least four interested citizens from the community of each model school to assist in implementing the program, and to evaluate their contributions.

--Work with teachers in each model school to develop an instrument evaluating the effectiveness of the program in achieving the affective and cognitive goals stated in the program design.

--Work with teachers in each model school to develop an instrument for evaluating the effectiveness of the program in achieving skill-behavior goals stated in the program design.

In the summer of 1971 two workshops were conducted for administrators, teachers, and students from four pilot schools in the inner city. The workshop participants, working in teams, developed guidelines and compiled information on the Toledo environment and its problems. The topics researched during the summer workshop were government, housing, power plants, solid waste, water pollution, air pollution, waste water treatment, urban trees, and recreation. Teams of students and teachers compiled the following information on each topic: Basic information, problems and possible solutions, field trip and tour opportunities, human resources, and instructional aids (books, pamphlets, films, overlays, games, kits, etc.). All information was published (Environmental Education Program, Toledo Public School, 1971, 215 pp.) and made available to Toledo administrators, teachers, and students.

In the fall of 1971, the Environmental Education Program was started in the four pilot schools. To assist the teachers, four University students trained in the use of environmental encounters were assigned to the model schools, one university student to each school. University students served as consultants and offered assistance to teachers who wanted to use environmental encounters. After a presentation, about forty percent of the teachers in the model schools expressed an interest in becoming involved in the project.

As expected, problems soon became apparent. Teachers who had participated in the summer workshops had a clear idea of the goals and approach of the program, but many others who wanted to participate needed guidance and assistance in developing encounters with their students. Moreover, a number of other problems imposed constraints on the pilot program. For example, class scheduling, particularly in the secondary schools, was not flexible enough to permit classes to explore environmental problems some distance from the schools. A related problem was the unavailability of buses to transport classes to where they wanted to go, when they wanted to go. The Toledo school system, like many others, was operating on an austerity budget. Thus, funds for additional bussing service, inservice workshops, and preparation of materials were scarce. Another problem, though not as serious, was community apathy and resistance, which stemmed from a lack of information concerning what the schools were trying to do. The attitude of citizens was, in effect, to wonder what school children were doing dipping water out of the Ottawa River when they should have been in school. One can conclude that the old-time education that was good enough for them was evidently not good enough to provide them with a continuing interest in matters educational, environmental, and governmental.

The Toledo Environmental Education Committee initiated the second year by arranging for a local university to conduct an extension course for administrators and teachers. As part of this course, participants identified the major constraints of the Toledo Environmental Education Program and developed recommendations to overcome each constraint. The report containing a description of the constraints and the recommendations was distributed to selected administrators and committees, with the request that they review and comment on the constraints and recommendations. Using those comments, the Toledo Committee then revised the recommendations and submitted them to the Board of Education, the Superintendent, Executive Committee, Curriculum Committee, and principals.

The recommendations relating to orientation and preparation of teachers included developing slide-tape presentations, bus trips, and inservice workshops designed to illustrate how to develop environmental encounters with students. Recommendations relating to more flexible class scheduling included:

Changing the standard six-period day to seven shorter periods so that two back-to-back periods could be available for an encounter-related trip; "freezing" students with particular teachers for more than one period once a week; adopting a modified modular schedule for team teaching; and scheduling mini-courses to be conducted between standard quarters shortened by a certain number of days. Recommendations relating to bussing were that bus tours for field trips be lengthened. The lengthened bus service and the inservice teachers' workshops added costs to the school system, but the Committee's position was that these are crucial factors.

Encounter projects initiated without any effective means of conducting a field trip when it is needed can be as unproductive as bus trips for teachers and students unprepared to use the trip as an integral part of an encounter project. If the environmental education classroom is the total community, then buses are the flexible "corridors" of that classroom.

School systems can solve problems involved in modifying their curricula if the persons responsible for basic policymaking and budget allocations are kept well informed of practical problems associated with the implementation of policies they themselves have already approved.

In 1972, the Toledo Public School System has expanded the program to include twenty schools. During the summer, one teacher in each of these schools was trained as an "environmental facilitator" to help implement environmental education into his particular school. The "environmental facilitators" were trained by an environmental education coordinator hired by the school system. It appears that the Toledo School System will be able to solve enough of its problems so that the environmental education program can be integrated into each school in the system by the fourth year.

## SUMMARY

This paper is intended to serve as a resource for school systems interested in developing comprehensive and effective environmental education programs. The ideas presented should assist youth in becoming more knowledgeable concerning the total environment and associated problems, more aware and skilled in how to become involved in helping to solve these problems, and more highly motivated to work toward their solution.

This approach would assure that all students would be exposed to an array of environmental issues and possible solutions. Integrated into existing subject areas, relevancy would be provided, and environmental education would be practically immune to the expulsion that frequently threatens new programs when funds are limited. Moreover, this approach fits into existing courses without restructuring of the curriculum.

To implement this instructional program into a school system (K-12), it is important that an environmental education committee be formed to provide the leadership, teacher training, and supportive services essential to the program's success. To assist the teacher in implementing the instructional model discussed in this paper, the role of the environmental education committee would be to help provide the supporting services (human, instructional, fiscal, etc.) essential to the success of the program. Some important supporting services include written guidelines (principles to follow while integrating environmental education into the instructional program, role of teacher and student, ways to handle problem solving and values clarification, etc.), teacher training sessions (community problem solving, valuing, community sensitivity, etc.), and assistance to teachers so they may more effectively overcome important constraints to the full implementation of the environmental education program.

The role of the classroom teacher is to expose the learner to the community environment in an effort to identify community environmental

interests and concerns. Once students have identified their interests and concerns, the role of the teacher is to assist class members in working through the processes of community problem solving and values clarification as they relate to the topics of high interest and concern of the youth. In this process, the students should be developing attitudes (knowledge and feelings), values, and skills important in producing environmentally literate citizens.

An important school-wide program objective would be to have each student at every grade level exposed to the processes of community problem solving and values clarification sometime during the school year. The timing of this exposure would depend on the judgment of the class.

If an environmental education program revolved around community problem solving and values clarification, a twelfth grader might not be exposed to all aspects of the environment. However, with the community problem-solving approach advocated by this system, a twelfth grader who had been exposed to this program should be more sensitive (total awareness) to his environment, better able to recognize environmental problems, more sophisticated in the use of problem-solving skills essential to the solution of emerging environmental problems, and more inclined to participate in dealing with environmental problems than the student who is exposed to conventional forms of instruction. Also the learner would have an understanding and appreciation of the importance of relating ecological, economic, social, technological, and political information in solving present or future environmental problems.

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